

Ancient Metals in Advanced Materials: Cyanide-based Coordination Polymers

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The rational increase of structural dimensionality is an important synthetic goal in supramolecular systems. The Leznoff group has been incorporating paramagnetic and diamagnetic metal centres and non-octahedral cyanometallates into polymers, targeting magnetic, vapochromic, birefringent, luminescent, high dielectric, negative- thermal expansion (NTE), and other properties. In particular, neglected linear d^{10} $[M(CN)_2]^-$ building blocks (M=Au,Ag) have been targeted to take advantage of attractive metallophilic interactions to increase structural dimensionality. Several property-based vignettes from this work will be presented in this lecture. For example, simple "mineral-like" cyanoaurate(I)-based polymers of the form $M[Au(CN)_2]_2(H_2O)_x$ with unusual magnetic and vapochromic properties (M=Cu, Ni) or very high birefringence (M=Pb) will be profiled. The use of luminescent $Zn[Au(CN)_2]_2$ as an ammonia sensor and the effect of metallophilicity on NTE will also be outlined. Time permitting, as a comparison with the linear $[Au(CN)_2]^-$ unit, coordination polymers with the square-planar d^8 $[Au(CN)_4]^-$ and $[Au(CN)_2Br_2]^-$ building blocks and their properties will also be described.

Refs: *Chem. Soc. Rev.*, **2008**, *37*, 1884; *J. Am. Chem. Soc.*, **2008**, *130*, 10662; **2009**, *131*, 4866 and 18435.